

PPL Electric Utilities Corporation

PPL Smart Grid Project

Abstract

PPL Electric Utilities Corporation's Smart Grid project includes new equipment to automate distribution circuits integrated through the installation of new grid communications and control systems. New automation equipment is being installed at 10 distribution substations and 50 distribution circuits in the coverage area. The project focuses on upgrades in south-central Pennsylvania, largely in the vicinity of the City of Harrisburg. The distribution automation equipment enhances system reliability through better protection and faster response and isolation of outages, while simultaneously lowering costs for operations and maintenance of the system. An additional objective is to improve the voltage for delivered electricity, reducing customer usage and deferring the need for additional power generation capacity in the region.

Smart Grid Features

Communications infrastructure includes installation of a new WiMax communication network and a fiber backhaul at each of the 10 substations involved in the project. New automated distribution equipment is being equipped with supervisory control and data acquisition (SCADA) capabilities for integration with the communications and monitoring network. This communication upgrade allows the distribution system operator to more precisely observe and manage the distribution system, providing a more effective response to power outages and helping to reduce the number of customers out of service through automated switching. Remote monitoring equipment also reduces the need for line personnel to physically visit grid sites, lowering system maintenance costs and truck fleet fuel usage.

Distribution automation systems involve the installation of automated distribution equipment on 50 circuits, including capacitor banks, vacuum reclosers, and load break air switches. These new devices are being equipped with advanced fault diagnostic capability and fault locating devices, enabling the distribution management system to identify the approximate location of line faults. The system also collects data on operation and device health of capacitors, reclosers and air break switches. This capability partly eliminates the need to perform field inspections and gives the operator the ability to obtain the data remotely. The automated distribution grid provides more rapid identification and response to grid events, reducing the impact and duration of power fluctuations and outages on customers. Along with improved system reliability, automation systems are being deployed as a means to reduce costs and emissions from operations and maintenance of the grid.

At-A-Glance

Recipient: PPL Electric Utilities Corporation

State: Pennsylvania

NERC Region: ReliabilityFirst Corporation

Total Budget: \$38,109,316

Federal Share: \$19,054,516

Project Type: Electric Distribution Systems

Equipment

- **Distribution Automation Equipment for 50 out of 1,153 Distribution Circuits**
 - Distribution Management System
 - Distribution Automation Communications Network
 - SCADA Communications Network
 - Automated Distribution Circuit Switches
 - Automated Capacitors

Key Targeted Benefits

- Improved Electric Service Reliability and Power Quality
- Reduced Operating and Maintenance Costs
- Reduced Costs from Equipment Failures
- Deferred Investment in Distribution Capacity Expansion
- Reduced Electricity Costs for Customers
- Reduced Truck Fleet Fuel Usage
- Reduced Greenhouse Gas and Criteria Pollutant Emissions

PPL Electric Utilities Corporation (continued)

Distribution system energy efficiency improvements involve the integration of capacitor automation and a power quality monitoring system. The capacitors improve voltage and volt ampere reactive (VAR) control, power quality, and increase distribution capacity by reducing energy losses on the distribution system. Distribution management system algorithms include logic to optimally switch automated capacitors to maintain voltages within prescribed limits.

Timeline

Key Milestones	Target Dates
Communications upgrade installation start	Q3 2010
Communications upgrade installation complete	Q4 2010
Distribution automation installation start	Q3 2010
Distribution automation installation complete	Q2 2012
Distribution management system installation start	Q3 2010
Distribution management system installation complete	Q2 2012

Contact Information

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